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**Question Paper Code : 14115**

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Elective

VLSI Design

VL 7012 — MIXED SIGNAL IC TEST AND MEASUREMENTS

(Regulation 2013)

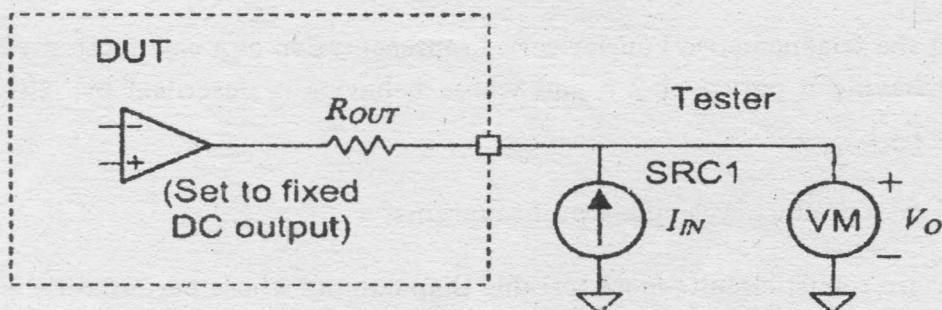
Time : Three hours

Maximum : 100 marks

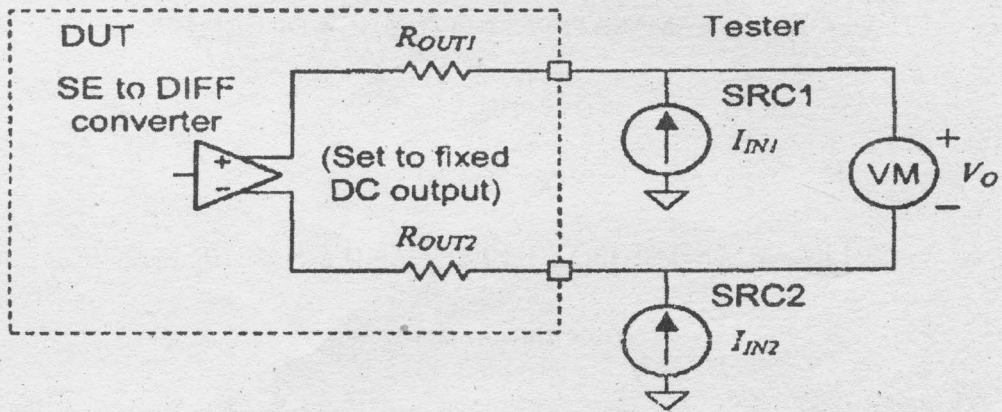
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

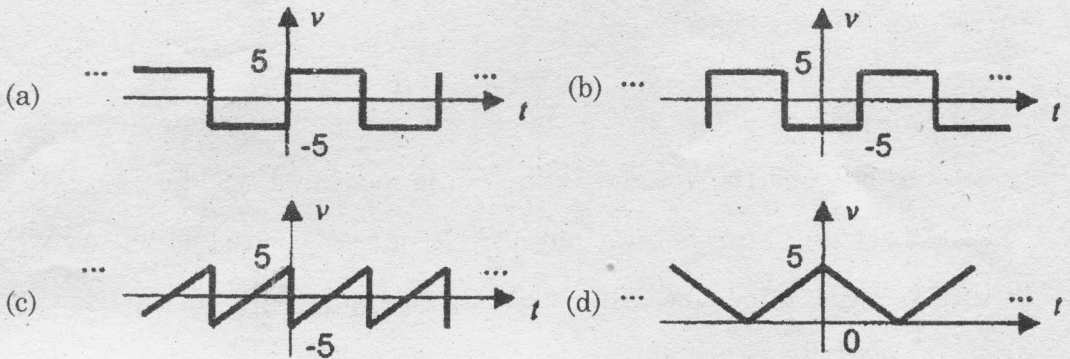
1. What are the applications of mixed signal testing?
2. What is a test engineer?
3. In the output impedance test setup shown in Figure, current source SRC1 is set to 10 mA and the voltage at the pin is measured, yielding 1.61 V. Then SRC1 is set to -10 mA and the output voltage is measured at 1.42 V. What is the total output impedance ( $R_{OUT}$  plus the amplifier's output impedance)?



4. In the differential output impedance test setup shown in Figure, the current source SRC 1 is set to 10 mA, SRC2 is set to -10 mA and the differential voltage at the pins is measured at 201m V. Then SRC1 is set to -10 mA, SRC2 is set to 10 mA, and the output voltage is measured at  $\sim -199$  mV. What is the differential output impedance?



5. What is the purpose of the PGA in a DC multimeter's front end?
6. Why is Kelvin connections used to connect high-current DC power supplies to the DUT?
7. Find the trigonometric Fourier series representation of the functions displayed in (a)-(d). Assume that the period in all cases is 1 ms.



8. Find the trigonometric Fourier series representation of a saw tooth waveform  $x(t)$  having a period of 2 s and whose behavior is described by:  $x(t) = t$   $-1 < t < 1$ .
9. Why does product cycle affect profit margins?
10. Why are robust circuits more testable than circuits whose performance is near failure?

PART B — (5 × 16 = 80 marks)

11. (a) Explain with neat diagrams the CMOS fabrication steps.

Or

- (b) Explain Focused Ion Beam Equipments.

12. (a) Explain Leakage Testing.

Or

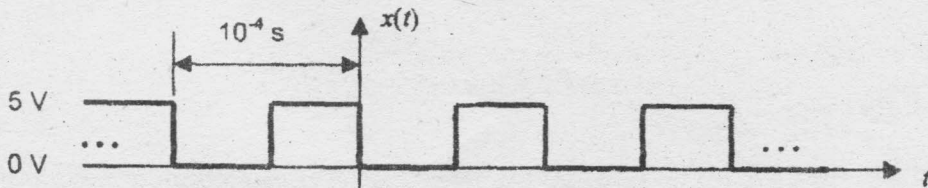
- (b) Explain Continuity Test Technique.

13. (a) Explain Calibration and Relay Matrices.

Or

- (b) Explain Relay Control Lines.

14. (a) Determine the Fourier series representation of the 5-V, 10-kHz clock signal shown in Figure and plot the corresponding magnitude and phase spectrum.



Or

- (b) A discrete-time signal is described by its DTFS representation as  $x[n] = 1 + 2\cos\left[2\left(\frac{2\pi}{8}\right)n + \frac{\pi}{4}\right] + 0.5\cos\left[3\left(\frac{2\pi}{8}\right)n\right]$ . Determine the time-domain samples using MATLAB'S Inverse FFT Routine.

15. (a) Explain Serial Versus Parallel Scan with necessary diagrams.

Or

- (b) Explain BILBO Circuits with examples.